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ABSTRACT

High tech organizations such as Storage Technology Corporation (STK), a producer of hardware and software within the mainframe, mid-range, and open systems (networked) environments, are increasingly under pressure to both reduce cycle time in bringing newer technologies to an international marketplace and produce timely and effective instruction. Traditional cascaded Instructional Systems Design (ISD) Models, assumed to be in common practice, are used as processes at STK. A survey was distributed to determine which steps are followed in an ISD model and why certain steps are omitted, with a 69% response rate. Findings indicate that the models are not followed because employees do not understand all the steps or do not have the time to complete them, or because decisions have been preempted prior to the project getting to the instructional designer. The ability of ISD models to meet instructional designer needs is discussed in light of the inquiry. Findings suggest that traditional ISD models, after which STK processes are patterned, are not followed, and therefore not of value to the corporation other than to satisfy a need to implement a standard for doing business. (Contains 10 references.) (SWC)

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Title:

A Case Study of Instructional Design Practices: Implications for Instructional Designers

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Abstract

High tech organizations such as Storage Technology Corporation (STK) are increasingly under pressure to both reduce cycle time in bringing newer technologies to an international market place and produce timely and effective instruction. Traditional cascaded Instructinal Systems Design Models (ISD), assumed to be in common practise are used as processes at STK. A survey was distributed to determine which steps are followed in an ISD model and why certain steps are ommitted. Inquiry findings indicate that the models are not followed because employees do not understand all the steps, do not have the time to complete them, or decisions have been preempted prior to the project getting to the instructional designer. The ability of ISD models to meet instructional designer needs is discussed in light of the inquiry.

Introduction

Current Instructional Design Models, defined here as: traditional cascaded models (Fig. 1), relying on formal rules and linear steps, are assumed to be commonly applied in corporate educational departments (Hannum & Hansen, 1989). Proponents of these models, such as Hannum & Hansen, Dick and Carey, and others, have adapted a systems approach to instructional design. The outcome of this adaptation posits an increasing use of formal instructional systems design (ISD) models in corporations (Hannum & Hansen, 1989).

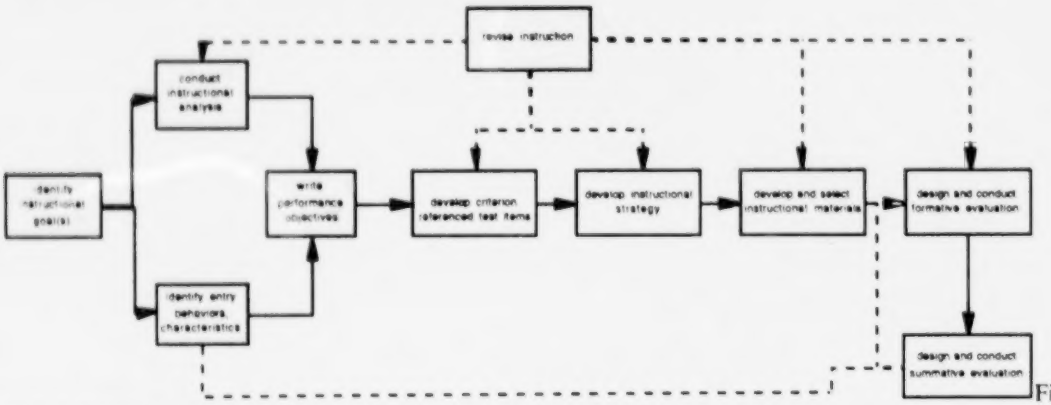

Figure 7 The Dick & Carey ISD Model

The role of technology in the corporate world

Technology in the corporate world continues at an unprecendented expansion since ISD models came into widespread use. Along with technological advancement, there exists a coevolving use of technological tools designed to facilitate use of the new technologies. Today's corporation presents us with unprecedented complexity. Such complexity produces a need to provide timely training, not only of the technologies themselves, but also of the tools which provide access to using the technologies.

The effects of technological change spill over to corporations which may not necessarily think of themselves as "technology-based." Examples extend to workers needing to learn new phone systems, email, word processing, data bases, and a myriad of other technological tools which permeate the modern corporation.

Cross-domain knowledge thus becomes an essential component for workers. They must not only cope with the need to understand their primary job function, but also must acquire whatever corollary knowledge of tools deemed necessary to "do their job."

While rapid enhancements in a wide range of technologies drive rapid turnover of new products, they also create an easily reached global marketplace. The global marketplace increases competition and subsequently generates a need to reduce cycle time for new product development. Reduction of cycle time extends to include instruction and training. The

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challenge of producing effective instruction, on a timely basis by corporate education departments, increases proportionately with the technological change. An ever more rapid cycle of new product development drags with it a need for timely new product training.

The influence of standards criteria

By the year 1995, the European Union (EU) imposed the requirement of meeting ISO 9000 Standards as a prerequisite for conducting business within its member countries. ISO 9000 standards brought Total Quality Management (TQM) to all corporations conducting business with the EU. Therefore, ISO 9000 standards provided a measurable standard of quality for any corporation doing business with the EU. Corporations needed "certification" by an independent agency, which stated the corporation met the standards. These independent agencies conduct yearly audits of certified corporations, ensuring continued compliance with the ISO 9000 standards.

A great deal of time and effort has been put forth by multinational corporations to comply with the standards. A component of the standards is, "...quality education and training" (Scherkenbach, 1990). In effect, corporations must not only have education plans in place for their employees, but must also comply with a rigid process for the design, development, and delivery of such education. On the surface, ISD models seem to represent the perfect marriage of meeting ISO standards and producing effective instruction.

Problem definition

Given the need to "reduce cycle time" while at the same time cleaving to ISO 9000 standards, how do corporate education departments fare in producing quality as well as timely instruction?

Research Question

Before a measurement of how well do corporate education departments meet the needs of their customers can be made, a research question centering around how the departments go about producing instruction must be answered. The primary motivation for this study at Storage Technology Corporation becomes, "How does the process of instructional systems design proceed at Storage Technology Corporation (STK)?"

Prior studies

The theoretical grounding which underlies this inquiry concerns accepted instructional design models such as those of Dick and Carey (1990). These models have long-standing application in both industry and in the military. Recent publications (Wedman & Tessmer, 1990 and Edmonds, Branch & Mukerjee, 1994) have sought to address the inadequacy of traditional design models.

A number of authors have recognized the limitations of ISD models in fast-paced environments, or environments where cultural factors interject themselves in the design process. Wedman and Tessmer (1990) describe the potential for erosion of educational quality by haphazardly omitting steps from a design model. They propose a "layers of necessity" model which offers a set of heuristics by which steps can be omitted without completely destroying the quality of the instruction.

Edmunds, Branch and Mukerjee (1994) offer a framework for comparison of different instructional design models, with the idea of choosing a model which "best fits" the situation. Their comparison framework of the different models currently in use permits a reasonable assessment of which models to use for differing design needs, and a measure of the model's chance for being reliably successful, given different types of instruction (classroom focused, product focused, system focused).

Rowland (1992) attempted a definition how "expert" instructional designers and "novice" instructional designers approached the solution of an instructional problem. Large differences in approaches to instructional design problem solving emerged. Significantly, experts formed "mental models" and looked for causal relationships and deep system

understanding. They formulated solutions to different links within the problem, and adopted a variety of possibilities for those solutions. Their problem interpretation was categorized as ill-defined, in that they were rather flexible in adopting and discarding multiple solutions. In all cases they used lengthy analysis, multiplicity, and variety.

The above approach sharply contrasted to novices, who "believed" the information they were given and performed shallow analyses and referring to the problem information that was given them at frequent intervals.

The basic premise put forth by Wedman and Tessmer (1994) is that, "Design models are based on assumptions which are incompatible with practice." Wedman and Tessmer suggest the incompatibility exists because the design models do not permit "selective" exclusion of particular steps.

Since in their study steps were clearly omitted, then quality of instruction could be eroded due to the lack of any prescribed and analytical way to exclude such steps. Their study surveyed 73 training professionals involved in instructional design. The survey was a two part survey. The first part of the survey asked the frequency with which the subjects completed eleven steps in the ID model which are traditionally thought of as critical to the process. The second part requested the subjects to give reasons why a particular design activity was excluded.

The implication of Wedman's & Tessmer's, and Rowland's findings for the case of multinational corporations lies within the notion that the bulk of their technical trainers come from a technical background, with little or no background in instructional design

The question must be raised, "Does instructional design from such persons suffer from their lack of understanding of the process of ISD?" From this question the assumption that instructional design models are indeed followed during the production of instruction, needs a comprehensive evaluation, given the current corporate environment, with its cycles of technological change, requirements to reduce cycle time, and pressures of global competition.

Method

Storage Technology Corporation target population

Storage Technology Corporation (STK) is a producer of hardware and software within the mainframe, mid-range (small mainframes), and open systems (networked) markets. They are currently positioning themselves to enter the open systems market to a greater extent. STK is a multinational corporation, which does some 40% of its business in foreign markets. As such it fits the framework outlined above and is ISO 9000 certified. The major products STK has historically excelled in have been storage related, comprised mainly of high speed tape, and solid state storage systems in the terrabyte range and attached to large main frame computing environments.

Spheres of responsibility within STK Headquarters Corporate Education comprise five subsets, plus adjunct positions directly under the Director of Corporate Education. The five subsets follow:

- Training Technology (Multimedia)
- Hardware Education
- Software and Marketing Education
- Headquarters Education
- Leadership and Quality Education

Each department within Corporate Education encompasses different arenas of instruction. In addition there are satellite regional education offices within the US and other countries. As a result one of Corporate Education's functions is that of "train the trainer," i.e. to teach those who return to their respective locations to teach.

Subjects

A total of 67 subjects were included in the inquiry. Baseline information about these subjects is limited and currently generalizable to stating that they have diverse education and backgrounds, regarding both ISD and their subject content areas. Job responsibilities seem to reflect this diversity, ranging from being involved in the entire process of ISD, plus delivery (teaching), to being involved in just a few of the component steps, i.e. just delivery or just the design phase, or development phase. For the purpose of this study, delivery will be included in the ISD process.

Instrument

The inquiry utilized a survey adapted from Wedman & Tessmer (1994) which was based on Dick's and Carey's (1990) ISD model. The survey probed which ISD activities get completed, which activities are omitted, and why the activities are omitted. The activities covered the same territory as Wedman and Tessmer (1993) and are outlined below:

- conduct a needs assessment
- training is the solution
- conduct a task analysis
- write learning objectives
- identify learning outcomes
- assess student entry level skills
- develop test items
- select instructional strategies
- select media formats
- pilot test instructions
- do formative evaluation

Frequency of inclusion in the ISD process again followed Wedman and Tessmer and was expressed as, *Not applicable (NA), Always, Usually, Occasionally, Never*. In addition we asked if there were design activities which the respondents did which were not addressed in the survey.

A second part of the survey listed reasons which were germane at STK about why certain activities were not completed. They are listed below:

- not perceived as applicable (NA)
- lack expertise
- decision already made
- unnecessary
- no time
- no money
- customer will not permit inclusion
- restriction on travel
- no process in place

A third portion probed respondents background, including their education in ISD, their education for the content area within which they produce instruction, their experience with ISD, any prior experience or formal instruction in teaching. In addition there were open-ended portions which probed perceived problems with STK's apprach to ISD and solicited input as to how to change direction.

Baseline information therefore, addressed what combinations of instructional design experience and education in instructional design the respondents bring to the department. It also addresses what subject matter expertise respondents bring to their design activities.

Analysis

There were a total of 46 persons who responded to the survey (69%). Of the 46, 8 (17%) had formal university level courses in instructional design. Only 4 (9%) had a degree or a major area of study in instructional design. 18 or 39% had graduate degrees, 16 or 35% had undergraduate degrees, 2 or 4% had associate degrees and 6 or 13% had high scool diplpomas. The group with the lowest number of degreed personnel were in the hardware education group (31%), the highest number were in the software engineering group (100%).

Table 1: numbers and percentages of respondents with ID course work

Ed Departments @stk	Number & percentage of respondents with IT course work
Training & Technology Group	4 57%
Hardware Education	2 14%
Software & Marketing	1 16%
Leadership & Quality Education	2 40%
Headqarters Education	2 11%
Management	1 33%

It should be noted that the above percentages of individuals with IT course work would drop if those who did not respond to the questionnaire had done so (informal conversation with members of the department). The above table also refers to prsons who have had course work in IT. The number of persons holding degrees in IT at STK Corporate Education is actually four.

Results

Table 2 Percentage of design activities completed by the respondents

Activity	always	usually	occasionally	never
conduct needs assessment	27%	39%	24%	9%
training is the solution	12%	51%	9%	28%
conduct a task analysis	42%	27%	27%	4%
write learning objectives	66%	33%	0%	1%
identify learning outcomes	27%	36%	15%	12%
assess entry level skills	19%	22%	36%	22%
develop test items	4%	33%	39%	24%
select instructional strategies	27%	33%	33%	7%
select media formats	26%	26%	36%	12%
pilot test instructions	44%	15%	29%	12%
conduct form-ative evals.	25%	30%	30%	15%

The above results loosely follow those of Wedman and Tessmer (1993), however, followup discussions with respondents revealed misconceptions about design activities. An example: Persons involved in teaching long term coureses mistook normal course maintenance, the process of adding new information to a course and deleting outdated information, with formative evaluation.

No respondent stated they completed all the design activities 100% of the time, and only one respondent stated they "usually + always" completed design activities.

Of the activities most frequently accomplished writing learning objectives was most often completed, followed by piloting test instructions. Writing learning objectives was the only activity identified as being always done by more than half of the respondents.

Why activities get excluded

Table 3 Reasons for exclusing ID activity

Activity	NA	Lack expertise	Client non-support	Decision already made
needs assessment	6	3	5	21
Training as solution	5		2	23
Conduct a task analysis	4	5	4	12
Write learning objectives	7	4	1	5
Identify learning outcomes	5	6		1
Assess entry level skills	2	3	2	8
Develop test items	6	3	1	4
Select instructional strategies	4	5	1	11
Pilot test instructions	8	3		1
Conduct formative evaluation	5	1	3	2

Table 3: continued

Activity	Unnessary	No time	No money	Travel restrictions	process not in place
needs assessment	4	9	4	2	5
Training as solution	1	1		2	1
task analysis		6	2	1	2
Learning objectives	1	1		1	1
Learning outcomes				1	4
Assess entry level skills	3	7	2	4	7
Develop test items	4	2			3
Select instructional strategies		2			2
select media formats	1	1	3		
pilot test instructions	1	7	1	2	2
conduct formative evaluations		10	6	2	8

The client non-support category was excluded fromt the above table because it was not regarded more than three timnes as a limitation on design activities.

The most common reason for the exclusion of design activities was the decision had already been made prior to the designer getting the project. The categories where this reason is most evident are conducting needs assessment, identifying training as the solution to the instructional problem, and conducting a task analysis.

Discussion

The results of the survey indicate that not all design activities are done for all projects. In the above cases, the reasons for the decision already being made can be loosely grouped into the category of "corporate culture." Decisions about what projects were to be taken on as instructional projects were generated largely through a corporate Program Management Process(PMP) which has as a requirement a preliminary education plan prior to the product's going through a gated process (in this case an idea gate.) The preliminary plan is supposed to be generated by a responsible manager.

No manager involved with this study took a formal part in any design team. Only one filled in the questionnaire but qualified the answers by saying, "from the time I was an education specilaist." Other management people responded by stating the questionnaire was not germane to them. One can conclude from the survey that determination of activities to include for any given project are largely predetermined.

Partly the above conclusion derives from lack of knowledge on the part of both management and employee of ISD. Historically, STK has approached instructional problems from the same base, i.e. STK has always implemented new product training so a lecture/lab course is an expectation of the corporation for any new product. There is both a knowledge gap and cultural impediment to following the ISD process at STK.

Conclusions

Steps are ommitted from ISD because they either are predetermined (decision already made) or they are largely misunderstood by those trying to implement them. As in Wedman and Tessmers' (1993), ISD practise is a situational activity at STK. The value of the ISD model must also be questioned. Clearly the corporation doesn't hire personnel based on their education in ISD, but rather for their skill in a specific content area. Knowledge of ISD is a supplementary skill.

The result of the study points to the conclusion that traditional ISD models, after which STK processes are patterned, are not followed, and therefore not of value to the corporation other than to satisfy a need to implement a standard for doing business. STK doesn't generally hire people with that knowledge, therefore the model should be discarded at STK and replaced with a more useable way of producing timely and effective instruction or instructional alternatives when called for.

Implications for practicing Instructional Designers

A high tech corporation such as STK values subject area knowledge more than ISD knowledge. This points to a possible dichotomy in the future of the field. Since the corporation is reluctant to hire people with strictly ISD background, such persons might be better suited to consulting. What STK values is content knowledge. Engineering managers are reluctant to offer engineers as subject matter experts, therfore engineering knowledge becomes a valued commodity.

Areas for further study

The question of whether STK follows a typical pattern for technical corporations might provide a fertile area for further research. Anecdotal information on two like corporations, HP and Sun indicates their technical training departments perform other functions, such as consulting and product support. Furthermore they often outsource soft skill components of training.

References

Dick, W. & Carey, L. (1990) *The systematic design of instruction* Glenview , IL. Scott Forsman & Co.

Edmonds, Gerald S., Robert C. Branch, & Prachee Mukherjee. (1994). A conceptual framework for comparing instructional design models. *ETR&D* 42 (4). pp. 55- 71

Gagné, Robert. M., Leslie J. Briggs, Walter W. Wager. (1994). *Principles of instructional design*. Harcourt Brace Jovanovich College Publishers. Fort Worth. Texas.

Greer, Michael. (1992). *ID Project Management*. Educational Technology Publications. Englewood Cliffs. New Jersey

Hannum, Wallace & Carol Hansen (1989). *Instructional systems development in large organizations*. Educational Technology Publications. Englewood Cliffs. New Jersey

Rossett, Allison. (1987). *Training needs assessment*. Educational Technology Publications. Englewood Cliffs. Nerw Jersey

Rowland, Gordon. (1992). What do instructional designers actually do? An initial investigation of expert practice. *Performance Improvement Quarterly*, 5(2) pp. 65-86

Scherkenbach, William W. (1990). *The deming route to quality and productivity*. CEEPress. Washington, D.C.

Wedman, John & Martin Tessmer. (1990). The "layers of necessity" ID model. *Performance and Instruction*., 29(4), pp.1-8

Wedman, John & Martin Tessmer. (1994). Instructional designers' decisions and priorities: A survey of design practice. *Performance Improvement Quarterly*, 6(2) pp. 43-57